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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/824,291

Applicant(s)

MUHS ET AL.

Examiner

Asha Hall

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on August 7, 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-6 and 8-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-6, and 8-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 7 August 2007 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to because it introduces new matter into the disclosure. The added drawing, Figure 12, is not supported by the original disclosure. The objection to the drawings will not be held in abeyance.

Applicant is required to cancel the new matter in the reply to this Office Action.

Specification

2. The amendment filed on August 7, 2007 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: The Applicant has added new subject matter to the specification. Paragraph 20.1 was added to the specification, which states "Figure 12 is an isometric showing the fiber distribution panel being fed by the collector and feeding a hybrid luminaire" which is not in the original specification. Also, an amendment to paragraph 26, which states "Fiber couplings 125 in the distribution panel 124 connect the optical fibers 120 to the respective hybrid luminaires 126 as needed" was not in the original specification. The Applicant has also added a new "Figure 12" to the drawings, which include "the fiber distribution panel being fed by the collector and a feeding a hybrid luminaire", which is not in the original specification.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 103

Art Unit: 1795

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 5, 6, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muhs (J. D. Muhs, "Design and Analysis of Hybrid Solar Lighting and Full-Spectrum Solar Energy Systems", Solar 2000, July 16-21, 2000, American Solar Energy Society) in view of Levinson (US Patent 5,271,079).

As to claim 1, Muhs discloses a hybrid solar energy distribution system (hybrid lighting system, Figure 3, and described in the first paragraph in left column of page 3) with a preferred design for its collector (preferred design for the hybrid solar collector, Figure 6a). The system comprises: a receiver for receiving visible light (concentric fiber mount assembly, 3, along with the large core optical fibers, 4) that contains at least one fiber; a receiver housing (the housing surrounds the fibers and is shown in both Figures 6a and 6b), a fiber at least partially disposed in said housing (as detailed in Figure 6b), said fiber further transmitting visible light to a light distribution system ("light distribution system," 3, first paragraph in left column of page 3) further comprising at least one fiber distribution panel (Figure 6b); at least one hybrid luminaire ("hybrid luminaires," 5, in left column of page 3), and a means for controlling at least one of said hybrid luminaire and said light distribution system ("hybrid lighting control systems," 4, in left column of page

Art Unit: 1795

3). What Muhs fails to disclose is a mixing rod removably disposed in said receiver housing.

Levinson discloses a light mixing device that uses a mixing rod (14) to take supplied from a plurality of light generating devices and direct it evenly to a plurality of optical fibers (56) (Figures 1 and 2). Levinson teaches the use of said mixing rod to "collect more of the light emitted from a light source and supply that light to a plurality of optical fibers" (Column 2, lines 29-31). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the mixing rod of Levinson to the receiver of Muhs in order to collect more of the light emitted from the light source (i.e., the sun) and supply that light to the plurality of optical fibers (large core optical fibers, 4).

As to claim 3, Muhs teaches that the hybrid luminaries may incorporate "light originating from two or more sources, at least one being natural and another being electric" in the bottom paragraph of the right column of page 3. Muhs specifies sunlight as a natural lighting source for the hybrid luminaries in the second paragraph from the bottom in the left column of page 3 with the sentence: "Hybrid lighting systems will depend on electric lamps when sunlight is incapable of supplying sufficient levels of illumination such as on cloudy, overcast days and at night." Muhs further specifies that the electric source may be "conventional fluorescent lamps located in luminaries" in the bottom paragraph of the left column of page 3.

As to claim 5, Muhs discloses a hybrid collector(preferred design for the hybrid solar collector, Figure 6a). The system comprises: a primary mirror for producing reflected full spectrum solar radiation (primary mirror, 1, Figure 6a), as well as a

Art Unit: 1795

Secondary Optical Element (Secondary Optical Element, 2) whose purpose is to “focus visible, nondiffuse solar energy onto a series of centrally located, large-core optical fibers, while at the same time focusing the rejected infrared (IR) solar radiation onto a concentrating PV cell located at the back of the secondary optical element” (bottom paragraph of left column, page 4). This Secondary Optical Element reflects visible light and, therefore, is a secondary mirror. In fact, it is referred to as a “spectrally selective cold mirror” by Muhs in the top paragraph of the left column of page 4. Said Secondary Optical Element can also be considered to be a filter in the sense that it filters the solar radiation into visible light before it reflects it onto the fiber receivers (concentric fiber mount assembly, 3, along with the large core optical fibers, 4), as recited above and originally described in the bottom paragraph of the left column on page 4. Muhs further discloses a receiver for receiving visible light that contains at least one fiber; a receiver housing (the housing surrounds the fibers and is shown in both Figures 6a and 6b), a fiber at least partially disposed in said housing (as detailed in Figure 6b). Muhs discloses further comprising at least one fiber distribution panel (Figure 6b); at least one hybrid luminaire/hybrid luminaires (5) (column 1, p.3), and a means for controlling at least one of said hybrid luminaire and said light distribution system/hybrid lighting control systems (4) (column 1, p.3). However, Muhs fails to disclose is a mixing rod removably disposed in said receiver housing.

Levinson discloses a light mixing device that uses a mixing rod (14) to take supplied from a plurality of light generating devices and direct it evenly to a plurality of optical fibers (56) (Figures 1 and 2). Levinson teaches that the use of said mixing rod is

Art Unit: 1795

effective to "collect more of the light emitted from a light source and supply that light to a plurality of optical fibers" (Column 2, lines 29-31). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the mixing rod of Levinson to the receiver of Muhs in order to collect more of the light emitted from the light source (i.e., the sun) and supply that light to the plurality of optical fibers (large core optical fibers, 4).

As to claim 6, the secondary mount supporting the secondary mirror (in the Secondary Optical Element) of Muhs is shown in Figure 6a. Said structure is non-rigid in the sense that it allows the tilting of the eight flat sections of the secondary mirror by 2° (top paragraph, right column, page 5). Although Muhs quotes a blocking fraction of 5 % (top paragraph, right column, page 5), he also states that this fraction can be reduced upon routine optimization by one skilled in the art. In the same paragraph he states that such "optimization routines will likely reduce the blocking fraction to less than 3.0 % in future designs."

As to claim 9, Muhs shows the positioning of multiple collectors in a mirror farm array in Figure 5 and refers to the sun tracking system in Figure 6a (conventional rotational tracking mechanism, 6). Muhs mentions explicitly that these are solar collectors (caption, Figure 5). Therefore, the purpose of their tracking mechanisms is to track a single object (i.e., the sun). It would have been obvious to one of ordinary skill in the art to connect them to a single tracking system that tracks the position of the sun.

As to claim 11, Mohs describes an initial embodiment of the secondary mirror, which is part of said Secondary Optical Element, in the top paragraph of the right column of page 5 that "made of up of eight flat sections."

5. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muhs (J. D. Muhs, "Design and Analysis of Hybrid Solar Lighting and Full-Spectrum Solar Energy Systems", Solar 2000, July 16-21, 2000, American Solar Energy Society), Levinson (US Patent 5,271,079) as applied to claims 1 and 5 above and in further view of Nagao et al. (US Patent 3,626,040).

The combination of Muhs and Levinson teaches all the limitations of claims 1 and 5 above and further teaches that the system contains a bundle of fibers (approximately eight 18-mm large-core optical fibers, 4, Figure 6a), but does not teach that the fiber bundle comprises a thermally compressed fiber bundle.

Nagao et al. teach a method for making fused bundles of light-conducting fibers in which the fibers are placed within a mold, "heated to fusing temperature and compressed" with the aid of an applied pressure. As explained in column 1, lines 24-26, the fiber bundles resulting from this process have the advantage of being virtually free of "non-uniform distortions" and, therefore, improved optical performance. It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the fiber bundles of the modified device of Muhs with the thermally compressed fiber bundles of Nagao et al. in order to improve the optical performance of the latter by virtually eliminating non-uniform distortions in the fiber bundle.

6. Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muhs (J. D. Muhs, "Design and Analysis of Hybrid Solar Lighting and Full-Spectrum Solar Energy Systems", Solar 2000, July 16-21, 2000, American Solar Energy Society) in view of Levinson (US Patent 5,271,079) as applied to claim 5 and in further view of Kessler et al. (US Patent 6,416,181).

The combination of Muhs and Levinson above discloses all of the features of claim 5 and describes an initial embodiment of the secondary mirror, which is part of said Secondary Optical Element, in the top paragraph of the right column of page 5 that "made of up of eight flat sections". What the modified device of Muhs fails to provide is the primary mirror is segmented into multiple sections.

Kessler et al. disclose a large curved mirror (24) similar in shape and reflective function to the primary mirror of Muhs as part of a monocentric autostereoscopic optical apparatus (Figure 1). As Kessler et al. explain in column 12 lines 9-13, it is less expensive and more practical to assemble such a curved mirror from "two or more smaller mirror segments." It would have been obvious to one of ordinary skill in the art at the time of the invention to provide segmented mirror of Kessler et al. as the primary mirror in the collector of the modified device of Muhs in order to provide for a less expensive and more practical assembly of said mirror.

Response to Arguments

Amendments to Specification

1. The amendment filed on August 2, 2007 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no

Art Unit: 1795

amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: Paragraph [0020.1] Figure 12 is an isometric showing the fiber distribution panel being fed by the collector and feeding a hybrid luminaire. Fiber couplings 125 in the distribution panel 124 connect the optical fibers 120 to the respective hybrid luminaires 126 as needed.

Applicant is required to cancel the new matter in the reply to this Office Action.

Drawings

2. Due to cancellation of claims 2 and 7, the previous objection to the drawings have been removed.

Double Patenting Rejection

3. The terminal disclaimer filed on August 7, 2007 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of US patent 7,231,128 to any patent granted on Application no. 10/824,291 has been reviewed and is accepted. The terminal disclaimer has been recorded.

The double patent rejection on claims 5-18 and 10-12 have been withdrawn.

Claim Rejections 35 USC 103

4. With respect to claim 1, the Applicant argues that Levinson's mixing rod is sufficient only for artificial light such as the LED elements he teaches and claims. Therefore, the combination of Muhs and Levinson is non-functional in the applicants' solar light distribution system invention because the mixing rod will not withstand the duty requirements for mixing concentrated solar radiation.

The Examiner respectfully disagrees. Levinson teaches that the mixing rod collects more of the light emitted from a light source and supply that light to a plurality of optical fibers (col.2; lines: 29-31). In this case, the light source encompasses solar radiation as a light source.

5. All arguments are directed toward the claims 1 and 5 and their respective dependant claims as amended. Such amendments require new ground of rejection as presented above.

6. The Applicant argues that the mirror teaches of teachings of Kessler to Muhs/Levinson fails to teach the applicants' invention of currently amended Claims 1 and 5 comprising a light distribution panel.

The Examiner respectfully disagrees. The claim limitation recites that the primary mirror is segmented into multiple sections. Kessler et al. disclose a large curved mirror (24) similar in shape and reflective function to the primary mirror of Muhs as part of a monocentric autostereoscopic optical apparatus (Figure 1). Kessler et al. further teaches that it is less expensive and more practical to assemble such a curved mirror from "two or more smaller mirror segments" (col.12; lines 9-13). This statement reads on the applicant's claim limitation. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide segmented mirror of Kessler et al. as the primary mirror in the collector of the modified device of Muhs in order to provide for a less expensive and more practical assembly of said mirror.

Art Unit: 1795

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asha Hall whose telephone number is 571-272-9812. The examiner can normally be reached on Monday-Thursday 8:30-7:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1795

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJH



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SUPERVISORY PATENT EXAMINER